agriculture

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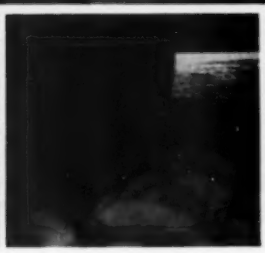
MONTHLY

Pig-pen feed selector panels, and motor for wet feed mixer



Pipe line feeder for delivery of wet feed to troughs

Feed proportioner and mill

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FARM ELECTRIC

HELPING BRITAIN'S FARMERS TO GREATER PROFIT

(050)

Agriculture

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Isolation box at Royal Welsh Show

Isolation Boxes for Cattle

Michael Haywood

CATTLE need to be isolated for several reasons, e.g., in cases of injury or illness and where the policy of quarantining new arrivals is adopted or required. Over 60,000 herds are now participating in the Ministry's Voluntary Brucellosis Schemes, which require the isolation of animals aborting or calving prematurely. In Brucellosis Eradication Areas it is also a legal requirement that such animals are isolated. It is also desirable that cows about to calve normally be placed in isolation, since it is at calving time that the danger of spreading infection is greatest.

The number of loose boxes required will vary according to the size of farm, but as a general guide it is advisable with a small herd to have one for every twenty cows; in a large herd one for every fifty may be acceptable. They should be sited, designed and equipped so that:

(*a*) healthy animals cannot approach those in isolation;
(*b*) disinfection or sterilization can be easily carried out;
(*c*) effluent and soiled bedding can be disposed of without endangering healthy animals (and, of course, without polluting water supplies or watercourses);
(*d*) carcases and after-births can be readily removed.

The basic requirement of any loose box is to provide a warm, dry bed with adequate ventilation.

Design and siting

An isolation box or boxes should be located conveniently near an access road, and if possible apart from the main group of farm buildings; it is often feasible to site such facilities on a secondary farm access road. On many farms it may be possible to convert existing buildings situated some distance away from the main farm buildings; on larger farms or estates old stables are often found in this situation. It can be a completely new structure, and if it is built mainly to comply with the Brucellosis Schemes it could, when not required for these purposes, also be used as a sick bay, calving box or for calf rearing.

Construction details

Ideally the box should not be under 4300 mm × 3600 mm and 2600 mm high to the eaves. Obviously, with conversions some latitude must be allowed in these dimensions but it must always be borne in mind that sufficient working space for the veterinary surgeon or at calvings is essential.

The walls should be constructed of 225 mm hollow or solid concrete blocks; alternatively 225 mm solid or 275 mm cavity brickwork can be used. Stonework is acceptable if it is weatherproof. The interior surface of the box should be rendered to a height at least 1500 mm above floor level with a fairly rich cement and sand mixture trowelled to a smooth glossy impervious finish with a steel trowel. The bottom of the rendering should be rounded into a cove with a small radius of, say, 40–50 mm—if a larger radius is used the animals or attendants may slip or fall.

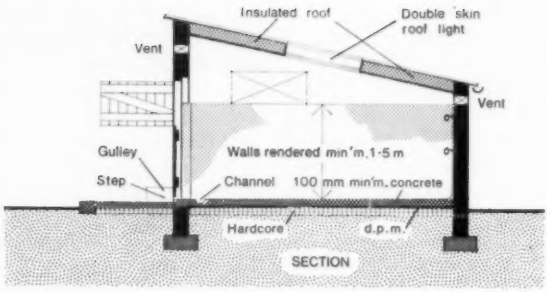
Doors are also important since it may prove necessary to remove a carcase from time to time. Door frames should therefore be heavier than usual and the doors themselves, which should be of the double stable type, should have a minimum width of 1000 mm, opening outwards and preferably capable of being lifted off their hinges.

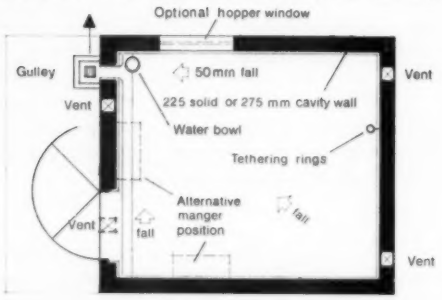
The floor should also be impervious and have a damp-proof membrane. It should fall towards a front corner and there should be a channel across the inside of the threshold to prevent seepage of effluent under the door. This type of detail can be seen in the accompanying plan.

If a series of isolation boxes is being constructed within an existing building the division walls between the boxes should be about 2500 mm high. This will prevent nose to nose contact and an animal from flicking water with its tail and contaminating an adjoining box.

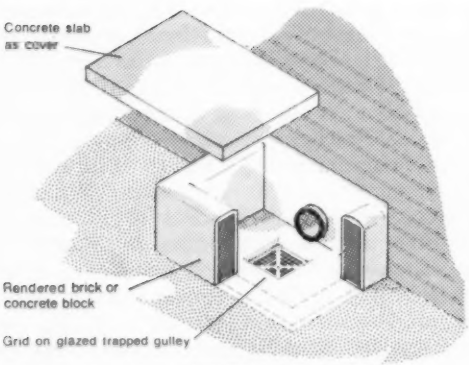
As the animal will be in the box on its own and heat will be generated only by its own metabolism, it is advisable that the roof at least should be insulated to help contain the warmth. Such insulation will also reduce the solar heat gain on hot days.

In the case of a range of boxes being constructed within an existing building, and having an interior feeding passage it is advisable to have an inspection or viewing window into each box provided the boxes do not face each other across the passage. It can be quite small, about 450 mm square, covered with welded mesh. The feeding and access door into each box from the passage need be only a standard door, say 900 mm wide, enough to allow for a bale of bedding straw.





PLAN



VIEW OF GULLEY AND COVER

Construction details for an isolation box

Services

Water must be laid on to the building, either direct from a main or from a suitable supply tank, with a ball valve, within the building. If the building is not insulated, precautions must be taken against pipes freezing. A supply of hot water for washing and cleaning is also desirable and for this a continuous type electric, wall water heater is very satisfactory; electricity will in any case be needed for lighting. Provision should be made for power points required.

In addition to artificial light, natural light is necessary, preferably in the roof and possibly also by standard agricultural type hopper windows; further light can be admitted through the door by opening the top section.

Fittings

To enable an animal to be secured for examination or testing each box should be fitted with a head yoke, a cow chain or two nose rings, one at a height of about 750 mm above floor level, the other at about 1500 mm. These fittings should be sited away from corners. A hay rack and/or manger should be provided; these may be removable and of almost any type, but it must be borne in mind that such fittings must be capable of being easily disinfected either *in situ* or when removed. A water bowl must be provided at a suitable height, and above the 'internal' gully or channel so that a jammed or leaking fitting will not wet a large area of bed.

Drainage

Drainage is probably the most important factor in considering isolation facilities because the easiest way in which infection can be spread is by way of polluted effluent or by water reaching grazed land or watercourses.

Dealing first with rain water, this can run off the roof into a separate gully and thence to a soakaway or watercourse or an existing drainage system. It is good practice with a mono-pitch roof to have the eaves at the back away from the doors and the 'internal' gully positioned so that contaminated water can be separated from clean water. Although an internal gully can be used in the isolation box, in the writer's view it is better to have a 225 mm square hole or pipe through the outer wall to an external trapped gully which has a watertight surround constructed of brick or concrete. This should have a 50 mm concrete cover slab fitting snugly and above the hole or pipe through the wall, thereby preventing draughts. The sealed gully should be connected directly to a separate soakaway which will cause no pollution or danger of contamination to other animals. This method is probably the best way of dealing with the relatively small amount of liquid effluent not absorbed by the bedding. An alternative method is to take the effluent to a sump from where it can be pumped out on to land not used for grazing. Again, care must be taken to prevent contamination by run-off to other stock or watercourses. Tankers and tractors used for the spreading must be washed down and disinfected after use in a place where no spread of infection can occur.

Used bedding from an isolation box should not be mixed with other farmyard manure or slurry. It should be stored away from stock and where no run-off can occur. Eventually it must be buried or burnt as this is probably the safest way of destroying unwanted organisms. If unburnt bedding is to be spread on the land it should not be put on grazing fields or near watercourses but should be ploughed in.

Old buildings converted into six isolation boxes at Trawscoed E.H.F.

Maintenance

Isolation boxes, like other farm buildings, should be as maintenance-free as possible and the use of plastic rainwater goods and a transparent roof light is recommended. One point is the woodwork—treated timber should always be used but unpainted this is difficult to disinfect satisfactorily unless it is retreated or creosoted following disinfection each time a box is vacated. It will be clear therefore that priming, followed by one undercoat and a coat of gloss paint, is the best approach.

Michael Haywood, A.R.I.C.S., is an Assistant Surveyor (Buildings) with the A.D.A.S., Farm Building Group at Regional Headquarters, Aberystwyth.

The 1972 Royal Smithfield Show will be held at Earls Court, London, from 4th to 8th December (inclusive).

A contractor well equipped to carry out all contracting operations and also plant hire

Group Operations: Employing a Contractor

Warner K. Hall

WHILST group operation of machines amongst farmers can provide advantages of reduced costs, availability of the latest equipment and full use of machines and labour, most members of successful groups are emphatic that if a group is to succeed then at least one of the members must have the ability to manage and operate the machines. This knowledge might well be available from the member or one of his staff. Machines in groups are used at a level nearer to full capacity than most of those found on farms; they therefore need expert control and operation, and must be serviced and repaired without delay if a satisfactory work programme is to be maintained. If a group does not already possess the ability to manage mechanization, then it can often be introduced to the group by using a contractor or by finding another member who is prepared to work for the group on a contract basis. There will therefore be situations where a contractor can provide a more suitable service than that to be found by sharing.

General and specialist work

About two-thirds of a contractor's work is in the field of drainage and lime spreading and only one-third on operations which are carried out generally on farms. Specialist work is carried out by trained operators using sophisticated equipment; contractors who undertake the more general kind of work are often one or two-man units using equipment similar to that found on farms. Generally farmers have used these contractors to deal with peaks and emergencies with which they are unable to cope themselves, and to be able to cope with such peaks a contractor operating in this area must, therefore, always be over-mechanized and over-staffed. In effect, the farm problem is transferred to the contractor who often has the same difficulties; in these situations he has little opportunity for forward planning and the possibility of being able to make an impartial financial appraisal of his business. Hence there has been a considerable reduction in the number of contractors available to do day to day work and an increase in the amount of specialist work to be done by specialist contractors. These specialist contractors will in the future continue to carry out contracting in drainage, lime and basic slag spreading, aerial and ground spraying and also specialized fertilizer application.

A fleet of combines harvesting herbage seed. For the smaller farmer this is a harvesting operation which may be best carried out by the contractor

Need for planning

There is a case for the employment of a contractor in farm situations where there is a need for a seasonal gang for operations such as silage making or the harvesting of other crops, or where the regular labour force is inadequate and increasing mechanization costs are not justified. Some of these operations can be carried out effectively by an agricultural contractor providing all

or part of the total machine and labour requirement. To fully use his specialized men and machines the contractor will need to plan very carefully in order to organize his work and tie up with other farms in the area requiring similar operations.

In some areas, a useful development can arise when the farmers, the A.D.A.S. adviser and the contractor get together and discuss the whole operation for the season ahead. This will include fertilizer and grass variety policy used on all the farms in order to achieve different dates of cutting, and to plan the sequence of cutting and the amount of work to be carried out on each farm. At the end of the season a further meeting is held and the whole programme for the following year considered. It is important that these discussions take place and that the workload of men and machines be very closely tied up. It is easy for a contractor to take on such tasks without really looking at the justification from his own point of view. He must make a financial appraisal of the whole exercise. There is clearly no future in providing a service to farmers which does not result in a profit to the contractor.

Taking the development of enterprise mechanization a stage further, there is a situation where a contractor can offer his services to operate all tasks carried out on the farm. An owner or tenant of a farm can contract for labour and mechanization and maintain responsibility for the day to day planning of his work and for the purchasing of commodities; or he can employ a contractor to manage day to day work of the farm, being responsible himself only for the major financial and planning decisions after discussion with the contractor. In many areas there appears to be a great potential for this type of contract work.

Machine hire

Plant hire has been associated in the past with the building and allied industries. There appears to be scope for this in agriculture. Machines are hired either on a daily or hourly basis, delivered to farms when required. Where this scheme is working it has been found advantageous to send one of the hiring firm's fitters to each machine every day to provide adequate servicing. By doing this the firm ensures that the customer has full use of the machine and that the machine is returned to their depot in a condition to be hired immediately to someone else. In this field of plant hire it is important to fully justify the purchase of any one machine and ensure that it has maximum use within its working season and life.

Farmers are likely to depend more on the service of contractors in the future. The contractor must have a planned season of work to justify his specialist machines and labour force. He is unlikely to be interested in, or capable of, providing an emergency service as in the past since this does not fit into his planned work pattern.

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Liquid Feeding of Glasshouse Crops

L. J. Hooper

THE use of liquid manure for horticultural crops goes back into history, but until relatively recent times was prepared by steeping animal manures in water. It was not until the production of concentrated water-soluble inorganic fertilizers and the introduction of reasonably precise irrigating equipment for glasshouse use, that liquid feeding became widely practised in the commercial glasshouse industry. What, then, are the advantages and disadvantages of liquid feeding for glasshouse crops?

Advantages

The high total quantity of nutrients required by some crops (e.g., tomatoes) cannot be applied as a base dressing, otherwise damage from excess salts would result; frequent top dressings are, therefore, necessary. As water has to be applied regularly in glasshouses, feed can be applied in the same operation with little additional effort. In dense crops such as carnations or all-year-round chrysanthemums, solid feeds are almost impossible to apply. Provided water distribution is uniform (and this in itself is essential), nutrient distribution is also uniform; even very small quantities of material can be distributed evenly. There is also less risk of excess salt damage to roots than when solid fertilizer is scattered among the plants. A liquid feeding system allows for necessary rapid changes in feeding programme, with the accompanying good control of plant growth.

Disadvantages

Whilst there are many advantages of a liquid feeding system, there are also some disadvantages. Salting out effects limit the amounts of the nutrients which can be prepared in concentrates; if attempts are made to prepare too concentrated solutions, a proportion of one or more of the nutrients will crystallize out and the diluted feed to be applied will be of the wrong nutrient ratio. Special equipment for diluting the concentrate has to be provided, thereby adding to costs.

Principles

It is important to emphasize that a liquid feeding programme for any glasshouse crop consists of two parts, *Base Dressings* (using solid fertilizer) and *Top Dressings* (using liquid feeds). It is very difficult, and in many cases impossible, to correct any imbalance due to inappropriate base dressings by means of the liquid feeds. The base dressings and the liquid feeds serve two separate functions, each of which is complementary to the other.

Base dressings are used:

(*a*) to bring the soil into the necessary nutrient balance for the establishment and early growth of the crop;

(*b*) to apply nutrients which are in relatively low demand by the crop during its growing period.

Thus, base dressings should be adjusted according to soil analysis data and can, in most cases, include all an individual crop's requirements for phosphate, magnesium and possibly boron.

Liquid feeds are used:

(*a*) to apply the nutrients which are required in large quantities throughout the growing period of the crop. This particularly applies to nitrogen, which can lead to plant imbalance if excessive at an early stage or, even worse, to serious root damage if soil nitrate levels are too high;

(*b*) to apply nutrients required in very small quantities where uniform and controlled distribution is required, e.g., trace elements such as boron.

Preparation of stock solutions

Liquid feeds can readily be prepared on the glasshouse holding provided reasonable care is taken.

For most purposes, feeds containing nitrogen and potash only are quite suitable—the phosphate needs of most crops can be provided by the base dressing. The basic material for nitrogen/potash feeds is potassium nitrate and there are three important factors relating to this material:

1. The analysis should be 13–14 per cent N, 42–44 per cent K_2O. Another material sold with a similar name contains about 15 per cent N and 10 per cent K_2O; using this would lead to wrong nitrogen/potash ratio.
2. Whilst nearly 25 lb potassium nitrate is soluble per gallon of boiling water, only about 2½ lb is soluble at 15°C and this reduces further to 1⅓ lb at 0°C. This means that if the basic solution is made too strong, salting out of potassium nitrate will occur at low temperatures and feeds based on this will have the wrong nutrient ratio in cold weather.
3. When it dissolves, the potassium nitrate itself causes cooling, so it is difficult simply to stir the required amount into mains water; heated water can be used if the solution is needed urgently. Alternatively, the material can be suspended in open-weave but fibre-free bags in the top of a tank-full of cold water; it will dissolve overnight, after which the bags can be removed and the solution given a final stir.

One and a half pounds potassium nitrate per gallon of water is the strongest solution which can sensibly be prepared, particularly for storage in winter. This yields a basic solution containing 2·1 per cent N: 6·7 per cent K_2O (N: K_2O ratio circa 1:3) which can be prepared in quantity and stored. As other nutrient ratios are required, ammonium nitrate (35 per cent N) can simply be added and stirred in. Nutrient ratios, amounts of ammonium nitrate and stock solution analyses are shown in Table 1.

Table 1

Preparation of stock solutions

Nutrient ratio $N : K_2O$	Composition	Nutrient Content (per cent weight/volume) $N : P_2O_5 : K_2O$
1 : 3	Basic solution = 1½lb potassium nitrate per gallon	2·1 : 0 : 6·7
1 : 2	Basic solution plus 6 oz ammonium nitrate	3·4 : 0 : 6·7
2 : 3	Basic solution plus 11 oz ammonium nitrate	4·5 : 0 : 6·7
1 : 1	Basic solution plus 21 oz ammonium nitrate	6·7 : 0 : 6·7

Occasionally a feed containing some phosphate may be needed, e.g., to give a $N:P_2O_5: K_2O$ ratio of 3:1:3. This can be prepared by adding 7 oz Di-ammonium mono-hydrogen phosphate per gal of basic solution together with 17 oz ammonium nitrate; the nutrient content of the resultant stock solution is 6·7:2·2:6·7.

Diluting concentrates

Recommendations for liquid feeding glasshouse crops are normally given in terms of parts per million nutrient in the diluted feed, e.g., 90 p.p.m. N: 180 p.p.m. K_2O. The required dilution of a stock solution or commercial concentrated liquid feed can be calculated using the following equation:

$$\text{Dilution} = \frac{\text{per cent nutrient in concentrate} \times 10{,}000}{\text{required p.p.m. of nutrient}}$$

Example

Recommended diluted feed—90 p.p.m. N : 180 p.p.m. K_2O

1. Select correct $N : K_2O$ ratio
   $= 1:2$ in this case
2. Ascertain the nutrient content appropriate to the ratio (Table 1) = 3·4 : 0 : 6·7
3. Calculate the dilution required using the dilution equation (this can be used either for N or K_2O once the correct nutrient ratio has been selected)

$$\left.\begin{aligned} \text{N—Dilution} &= \frac{3{\cdot}4 \times 10{,}000}{90} = 377 \\ \text{or} & \\ \text{K}_2\text{O—Dilution} &= \frac{6{\cdot}7 \times 10{,}000}{180} = 372 \end{aligned}\right\} \quad 375$$

A final dilution of about 1 in 375 would be appropriate in the example quoted; the dilution necessary for any required feed can be calculated in the same way.

Using magnesium and boron

It is generally preferable to apply magnesium in the base dressing, either by using magnesian limestone if the soil is acid or Kieserite if the soil is not. However, liquid feeds containing magnesium can be prepared; when required the nutrient is usually applied at 20 p.p.m. Mg in the diluted feed. Epsom salts should be used; the amount to be dissolved in the stock solution depends on the final dilution as shown in Table 2.

Table 2

Epsom salts required per gallon of stock solution

Final dilution of stock solution	Weight of Epsom salts per gal of stock solution
1 in 100	4 oz
1 in 150	6 oz
1 in 200	8 oz
1 in 300	12 oz
1 in 400	16 oz

Boron can be applied as a base dressing but the application rate is very low and may be difficult to apply in the glasshouse; the margin between sufficiency and excess of boron is very small.

If boron is used in the liquid feed, distribution is uniform in the house but great care is needed not to exceed the recommended rate (normally 0·5 p.p.m. boron in the diluted feed) or again boron toxicity may result. In all cases, it is essential to have the soil analysed before applying boron because of the narrow margin of safety of this trace element.

The concentration in the stock solution must be related to the final dilution; recommended rates of Boric acid or Borax are as shown in Table 3.

Table 3

Boric Acid or Borax required per 10 gallons of stock solution

Final dilution of stock solution	Weight per 10 gal of stock solution	
	Boric acid	Borax
1 in 100	½ oz	¾ oz
1 in 150	¾ oz	1 oz
1 in 200	1 oz	1½ oz
1 in 300	1½ oz	2 oz
1 in 400	2 oz	2¾ oz

N.B. The recommendations for the boron-containing materials are 'per 10 gallons' stock solution; these concentrations should not be exceeded.

Applying liquid feeds

Great emphasis has already been placed on the importance of both the correct base dressings and the correct liquid feeds in a balanced liquid feeding programme. It is impossible to give detailed recommendations in a short article but feeding programmes for most glasshouse crops have been prepared by the Agricultural Development and Advisory Service, e.g.,

General Laboratory Services Booklet No. 4 The liming and manuring of glasshouse soils and composts based on soil analysis. (This booklet is available without charge on request when glasshouse soils or composts are analysed by A.D.A.S. Soil Science Departments).

Advisory Leaflet 520: Liquid Feeding of Tomatoes.

Short Term Leaflet 123: The Nutrition of Glasshouse Chrysanthemums.

(Single copies of these leaflets may be obtained free from Ministry of Agriculture, Fisheries and Food (Publications), Tolcarne Drive, Pinner, Middlesex HA5 2DT).

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Mastitis Control

The Modern Approach

A joint experiment carried out by the National Institute for Research in Dairying and the Central Veterinary Laboratory of the Ministry of Agriculture, Fisheries and Food has demonstrated that mastitis can be controlled without the necessity for expensive bacteriological examinations and treatment of other than clinically affected cows during lactation. The basic essentials of the control system evolved in this country are the prevention of new infections by dipping the teats in a suitable disinfectant after milking, and the elimination of existing infection by the treatment of every cow at drying-off with a specially-formulated antibiotic preparation.

This system was shown to be effective in all of the herds which were in the experiment, but with varying degrees of success. Therefore there is a need for skilled veterinary advice to produce the best results.

For the average herd, the only laboratory involvement is to monitor the control system and this can be done by carrying out bulk-milk cell-counts each month. It is essential that dairy farmers make the fullest use of the service offered at modest cost by the Milk Marketing Board and some commercial veterinary laboratories.

A 'Mastitis Awareness Scheme', recently launched by the Ministry's Agricultural Development and Advisory Service, is aimed at achieving a much wider adoption of the principles of control mentioned above. This control system is available to any farmer who has an interest in controlling mastitis, and it is hoped that he, with the assistance of his veterinary surgeon, will carry it out. The Scheme puts before herd owners the results of research on mastitis control and stimulates the adoption of proven techniques which will improve substantially the yield and the level of profit of dairy herds for a low outlay.

Zero-grazing of Young Beef Animals

P. J. Turner

WORK at High Mowthorpe Experimental Husbandry Farm over the last four years has involved the feeding of cut grass to young beef animals.

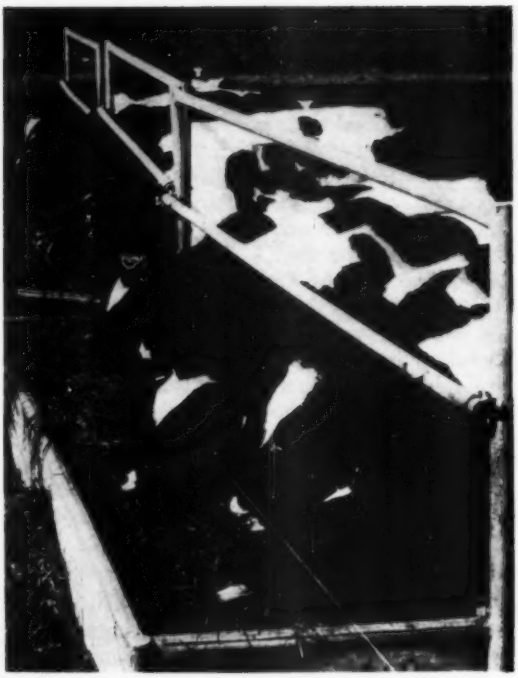
In the summer of 1968, Friesian calves born the previous autumn were divided into two groups at seven months of age, one group rotationally grazing paddocks and the other being held indoors and fed cut grass in troughs throughout each day. Summer liveweight gains and stocking rate were improved by 10–11 per cent by zero-grazing. There was also an increase of 11 per cent of carcase produced from each forage acre involved in this system. A major disadvantage to indoor zero-grazing was the amount of bedding needed during the summer in the yards (approximately one ton per beast) and the necessity to muck out the yards in midsummer.

Bearing these disadvantages in mind, and having free-draining chalk soil at High Mowthorpe, it was thought practical to cart cut grass to animals standing on small exercise paddocks. Consequently, in 1969, Friesian calves born the previous November were divided at six months of age; half were fed cut grass indoors and the others cut grass in Norwegian-type bins outside. The daily liveweight gains were 1·97 lb for the housed group and 2·20 lb for those outside. The fairly dry summer of 1969 had suited the outdoor system and the work was repeated with similar groups in 1970. The housed group in that year achieved 2·06 lb and the outdoor group 2·16 lb daily liveweight gain. The summer of 1970 was noted for drought conditions and so there was still no answer to the question of how the outdoor group would weather a wet summer.

Trials outdoors

In order to test the outdoor system under more commercial conditions, fifty-four November 1970 born Friesians were zero-grazed outdoors in 1971. They were confined by an electric fence to ¼ acre of a 2-acre exercise paddock. The first area of ground where the cattle stood sloped gently with the cattle standing on the higher ground. The result was that urine ran down to the bins and could not run away. This caused a slurry problem which was cured by moving the cattle and the bins to the other end of the exercise paddock and having the bins slightly uphill of the cattle, so allowing the urine to run away from the bins. The bins were moved forward on to clean ground when the cattle needed a dry lie-back area.

It was found, with the soil type at High Mowthorpe, that the animal's feet went through a thin layer of top soil and then hit a bed of chalk. This meant



Friesians zero-grazing at the High Mowthorpe E.H.F.

that although they appeared muddy at the bins, they did not sink in above hoof height. Provided there was dry ground available in the paddock on which to lie, the cattle were contented. Consequently in the wetter part of the season, May–June, the bins were moved four times. In the drier months of July, August and September, the bins were moved only three times. By the end of the season 1¼ acres of the original 2 acres had been used as exercise ground, and it was apparent that on the free-draining chalk soil at High Mowthorpe zero-grazing outdoors was possible.

An interesting feature with all the groups of autumn calves zero-grazed in their first summer has been that the animals have come in to the finishing yards in well-fleshed condition and have changed smoothly over to silage easy-fed in mangers. They have needed only a daily cereal ration of 6 lb per head per day and grass silage to appetite to fatten out of yards at sixteen months of age.

Younger calves born in February 1971 were also tried on the outdoor system, being turned out at three months of age. With these small calves it was felt that a more sheltered exercise paddock would be needed and a small area sheltered by trees was chosen. This turned out to be mistaken kindness as drying winds could not reach the trodden ground and a new site had to be found which was exposed to wind and sun. Thereafter, the calves were happy and an overall daily liveweight gain of 1·62 lb was achieved for the period on cut grass, a good performance for calves of this type. A feature of the bin feeding was that, as the cut grass finished at the end of the summer, the

calves learnt to eat silage given in their bins before yarding, again ensuring a smooth changeover to their winter ration.

The place for zero grazing

At High Mowthorpe it has been found that, provided a good growth of grass is available for cutting, the feeding of over 120 cattle takes between $1\frac{1}{2}$ and 2 man-hours per day. With the farm geared up for silage-making, the only extra machine needed is a self-unloading trailer. Part of the farm is in an intensive arable rotation and this includes a one-year ley break; this means that some 50 acres of land lying approximately 1 mile from the buildings comes into Italian ryegrass one year in eight. Obviously to fence and water this block of land for one year is prohibitive on cost, and this is the block of land which is cut and carted home for zero-grazing and silage. Zero-grazing has a definite place in these circumstances. Also, some farmers occupying land near to industrial and suburban areas where dogs are troublesome amongst cattle are considering eliminating that problem by cutting and carting.

The land at High Mowthorpe nearer to the buildings is on a grass/arable rotation with three-year leys which carry permanent perimeter fencing. On this block of land a different situation exists and these leys are grazed conventionally.

Integrated grazing and zero-grazing

The last four years have shown, unfortunately, that the cutting season in the northern climate is only of five months' duration. Grass is not long enough for cutting before the end of April, nor after the first week in October. To send a tractor and harvester in to short grass increases alarmingly the time taken and the cost, so work is now in progress at High Mowthorpe with autumn-born calves grazing conventionally at the beginning and end of the season with zero-grazing integrated in the good cutting months. The small area which is conventionally grazed at each end of the season provides silage and cutting grass in mid-season; it is also available for grazing if drought is experienced and there is insufficient grass for zero-grazing.

Zero-grazing for fatteners

Zero-grazing is a useful management tool in the instances where at normal turnout time there are a number of fat animals in the yards not of the required weight to attract Fatstock Guarantee. These animals, which if turned out to grass will lose condition and time, readily turn over to cut grass in their yard and lose no time in going to the butcher. It is especially useful in the case of young beef bulls which can be fattened on cut grass whilst remaining in their approved pens in the stockyard.

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Agricultural Land Classification of England and Wales

D. J. Griffiths

SINCE the end of World War II, more than a million acres of farmland in England and Wales have been taken for urban use. This is equivalent to an average annual loss to farming of 40,000 acres. Year to year transfers out of agriculture have fluctuated widely, according to economic conditions. However, despite the continuing pressure of urban growth and generally improving space standards, there has been no clear indication of a long-term upward movement.

Urban pressure on agricultural land

At first sight it might seem that an annual loss of 40,000 acres of farmland would not pose a vital problem in a country with over 24 million acres of cultivated land. The difficulty is, however, that much of our best farmland is located in the areas where urban pressures are greatest and is frequently the most suitable choice for development. All too often planners decide, on cost-benefit or other grounds, that the advantages of developing sites on the better quality land outweigh their value to the nation as a source of food.

One of the difficulties of taking an objective view of land losses is the comparatively small size of most urban development projects. Relatively few exceed 250 acres with the result that individual cases, even if they involve land of the highest productivity, may seem to be of little account. However, when the most reliable estimates show that the loss of farmland to development in the next thirty years may exceed one and a half million acres, the likely pattern of urbanization in relation to land quality becomes a matter of grave concern: particularly as it is already apparent from recent surveys carried out by the Ministry that our reserves of good agricultural land are very much less than had been previously estimated—only about seven million acres.

The configuration and layout of towns and settlements are also matters of importance as they influence the productivity of the surrounding farmland. For instance, if the urban development is reasonably compact, with few intrusions into the neighbouring countryside, agricultural potential should not be greatly affected. But where the situation is one of comparatively small agricultural areas interspaced with, or surrounded by, urban development, it becomes increasingly difficult to achieve the full potential of the farmland. Hence, for certain patterns of development, therefore, the resultant harm to food production may well be much greater than the associated loss of agricultural land might seem to indicate.

In assessing the likely consequences of urban growth on food production, therefore, land quality and urban intrusion effects must be taken into account

as well as the absolute area lost to farming. For these reasons a national land classification map is necessary to depict our land resources in terms of both agricultural quality and distribution in relation to urbanization.

Need for a new classification

The only national system of agricultural land classification formerly available was that developed in the early 1940s by the Land Utilization Survey under the direction of the late Professor Sir L. Dudley Stamp. While this had been an outstanding contribution to land use planning, there was a general feeling that it was becoming outdated as a result of the continuous post-war developments in farming technology and practice. Consequently, in 1962, a Study Group was appointed to devise an up-to-date classification for use in advising local planning authorities and government departments about the areas which it is desirable to retain in agriculture if the industry is to make its optimum contribution to the national economy. The Terms of Reference required that the system should be based on national standards, but capable of application to small areas; and that, where practicable, agricultural land classification maps of a standardized kind should be prepared.

The Study Group report was issued in 1966 and is published as Agricultural Land Service Technical Report No. 11. It recommended that, since land developed for most urban uses is permanently lost to farming, the main need was to distinguish the areas of greatest national agricultural value in the long-term. For this purpose a classification based on the permanent physical properties of land influencing crop production was considered to be the most suitable. Such a system would provide a reliable guide to the land with the greatest inherent value for food production; against this could be weighed, as necessary, secondary factors such as land use, farm structure, adequacy of fixed equipment and standard of management which are more susceptible to change in the short-term.

Classification adopted

In the system of classification recommended by the Study Group, and accepted by the Ministry, land is placed in one of five grades according to the extent to which physical factors impose long-term limitations on its agricultural use. The main physical factors taken into account are climate (particularly rainfall, temperature and exposure), relief (particularly landform and slope) and soil (particularly depth, texture, wetness, structure, stoniness and available water capacity). The limitations may operate in one or more ways, e.g., they may affect the range of crops that can be grown, the level and consistency of yield and the cost of obtaining it. Flexibility of cropping is given considerable weight but it does not outweigh ability to produce consistently high yields of a somewhat narrower range of crops.

The five grades are:

Grade 1: Land with very minor or no physical limitations to its agricultural use. Yields are consistently high and cropping highly flexible, with the ability to grow the more exacting horticultural crops.

Grade 2: Land with some minor limitations which exclude it from Grade 1. A wide range of agricultural and horticultural crops can usually be grown,

though there may be restrictions on the range of horticultural and arable root crops on some types of land in this grade.

Grade 3: Land with moderate limitations due to soil, relief or climate, or a combination of these factors, which significantly restrict the choice of crops, timing of cultivations, or level and consistency of yield. Grass and cereals are the principal crops and only the less demanding horticultural crops can usually be grown. The land is capable of growing reasonable yields when judiciously managed.

Grade 4: Land with severe limitations due to adverse soil, relief or climate or a combination of these. It is generally only suitable for low output enterprises and a high proportion of it is under grass with occasional fields of oats, barley and forage crops.

Grade 5: Land with very severe limitations due to adverse soil, relief or climate or a combination of these. It is usually under grass or rough grazing, except for occasional pioneer forage crops, and is of relatively little agricultural value.

Progress of the survey

The Ministry is now in the course of implementing the Study Group's recommendation that agricultural land classification maps should be prepared for England and Wales. In addition to the five grades of agricultural land, the maps also distinguish urban areas and other land primarily not in agricultural use. The base maps used by permission for the purpose are Ordnance Survey, Outline Edition (Seventh Series) Sheets, scale 1 inch to 1 mile (1:63,360).

To date, 70 of the 113 sheets in the Series have been published and a further 12 are either in the drawing stage or with the printers: see Map 1. Maps covering the whole of Northern and Yorks and Lancs Regions have been published, in addition to the principal areas which have been under consideration for large scale development. It is intended to complete the survey and publication of maps in 1973. An Explanatory Note giving a brief description of the grades and notes on the limitations of the maps is issued with each published sheet.

Some limitations of the maps

Because of variations in the extent and detail of information available on climate and the distribution of soils in different parts of the country, there is inevitably some variation in the exactitude of the survey. All published maps are, therefore, labelled 'Provisional'. It is intended to revise them in the light of experience and new information when reprinting becomes necessary.

It must be clearly understood that the survey is essentially of a reconnaissance nature. For this and other reasons mentioned in the Explanatory Note, care is needed in interpreting the maps and any enlargement in the scale could be dangerously misleading. In order to facilitate interpretation, the Ministry intends to produce a short report to support each land classification sheet. This will include notes on relief, drainage, geology, soils, climate and existing land use in the sheet area, and will draw attention to land that is appreciably above or below the average quality for its grade, or is of particular value for a specialized use.

Types of farm maps

The Study Group also recommended that, where practicable, economic assessments should be made in order to provide some measure of the productivity of the grades. For this purpose factors such as the pattern of farming, standard of fixed equipment and services and the level of management would need to be taken into account, although it was appreciated that differences in these might well be attributable to relatively short-term variations in the stage of social, economic and technical development of areas, rather than to differences in the inherent productivity of the land.

As a first step, it was decided to prepare and publish maps on a regional basis showing the broad distribution of farms according to their predominant enterprise, acreage and size of business. These could then be compared with the land classification maps as a first stage in determining the general extent to which land use and farm structure are associated with land quality and location.

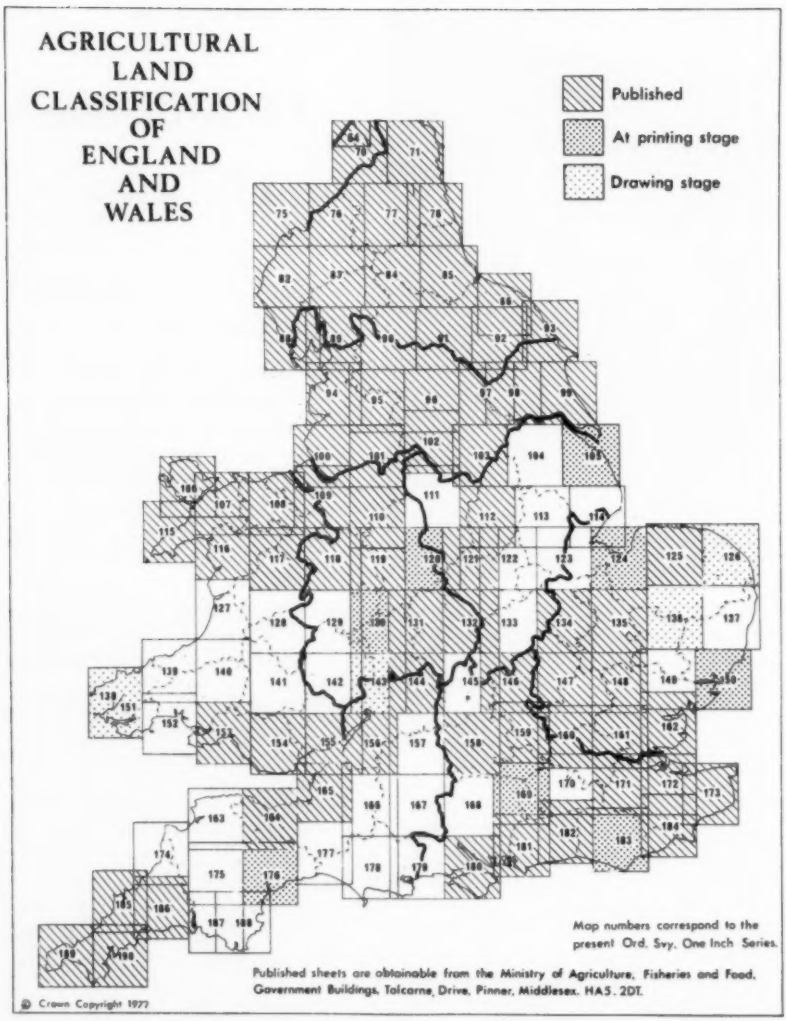
The new types of farm maps are based on parish statistics derived from the June 1968 Agricultural Census. Each full-time holding, i.e., each holding with an estimated annual requirement of 275 standard man days and over, is shown on the map by a coloured dot. The colour of the dot indicates the principal enterprise of the holding, and its dimension the size group within which the holding falls. Size of holding is measured in terms of acreage of crops, grass and rough grazing in the first set of maps, and in terms of the estimated standard man day requirement of the holding in the second set. The holdings are usually correctly assigned to the parish in which they lie but their distribution within it is at random, except where the parish includes both hill land used almost entirely for extensive sheep rearing and other land capable of supporting more intensive holdings. In such parishes the dots representing 'livestock mostly sheep' holdings have been placed as far as possible in the hill area and the remainder, as far as possible, on the other agricultural land. The maps are prepared on a regional basis to a scale of $\frac{1}{4}$ inch to a 1 mile. Parish boundaries are not shown but an inset map gives county boundaries and the location of some of the main towns.

Types of Farm maps showing the predominant enterprise on full-time holdings in relation to their acreage have been published for Northern, Yorks and Lancs, Eastern and South Western Regions and will shortly be available for Wales. It is intended to complete publication of the two sets of maps in 1973.

Conclusions

While acknowledging the limitations of the physical land classification system and types of farm maps, the Ministry considers that they provide the most reliable guide to the areas of greatest agricultural value to the nation that can be prepared in the short-term. In particular, the classification will help the Ministry to apply consistent standards in advising local planning authorities and government departments about the areas it is desirable to retain in farming. The maps will show clearly our limited resources of good agricultural land and how they are distributed in relation to existing urban and farming patterns. As a result they should facilitate agreement on a national strategy of land development that will take account of both the necessity to expand food production and the community's need for urban development and outdoor recreation.

MAP 1



Copies of Ministry publications and the Land Classification and Types of Farm Maps mentioned in this article can be obtained from Ministry of Agriculture, Fisheries and Food (Publications), Tolcarne Drive, Pinner, Middlesex, HA5 2DT. A price list is obtainable on application.

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A developing form of farm enterprise is the

Farmhouse Holiday

Nigel Harvey

TRADITIONALLY, the farmer has sold the produce he has raised on his farm to the distant consumer. But now a new and very different type of consumer has appeared. He is concerned not so much with the produce of the farm as with the farm itself and its surroundings. Further, he is no anonymous factor in the market but a named and known individual who comes in person to the farm, generally with his family. Many farmers have found that such consumers can form the basis of a pleasant and profitable type of enterprise.

New opportunities

In principle, of course, there is nothing particularly new in this. Signs offering 'bed and breakfast' were common in many areas of Wales and the West Country long before the war. As a matter of fact, the tradition is a good deal older than that; a few years ago, archeologists in Hertfordshire unearthed a Roman farmstead with a large swimming pool, far too large for purely domestic purposes, which had apparently been built in a time of agricultural depression to attract visitors from nearby St. Albans. But the annual summer migration from the towns to the countryside which the general ownership of cars, motorways and shorter working weeks have combined to create and increase is something new in both scale and scope. And it brings new opportunities to the farmer.

In general terms, the possibilities are numerous; but those open to the individual farmer on his individual farm are limited. Very few, for example, are prepared to go as far as the Home Counties farmer who converted half his fields to a golf-course. Many are unwilling to face the complications of a farm gate stall, a caravan park or a camping site; but quite a number agree with the agricultural economist who concluded that 'the provision of accommodation for holiday-makers in the farmhouse is potentially the most attractive of all recreational enterprises to farmers'.

There has been no national investigation of this kind of agricultural enterprise; but from local surveys and individual case-studies it is possible

to form certain general conclusions and offer certain general recommendations.

Visitors and their needs

First of all, who comes to stay on farms and why do they come? They vary immensely. One farmer included among his guests a professor of aerodynamics, a producer of plays, a monumental mason and a stoker at a power station. A survey of 155 visitors in one area reported thirty-nine different occupations and despairingly classified them as about one-third professional, one-third commercial and one-third 'other'.

These varied guests have much in common. For one thing, over three-quarters of them bring children; for another, they are generally agreed on the main reasons why they chose a farm holiday. They like the beauty and the quiet of the countryside; they like the prospect of fresh farm food; they like the relatively low cost of such a holiday and the novelty of staying on a farm. Their general order of priorities is reflected to some extent in the way they spend their holidays. Most of them spend a certain amount of time on or near the farm, but take little interest in the day-to-day work of the farm, preferring walking, riding or, when available, swimming, boating and fishing.

Typical autumn countryside in East Anglia

Farmer's costs

Such visitors desire more than the traditional bed and breakfast for which there is nowadays comparatively little demand. They want either accommodation in the farmhouse with an evening meal or, increasingly, a self-catering holiday. The latter has various advantages for the farmer and his

family, since it makes no domestic demands on them and offers a useful outlet for various kinds of farm produce. On many farms, too, there are disused farm buildings which can be converted satisfactorily to simple holiday-homes. The farmer can often reduce the cost of such conversions by doing at least some of the work himself, but he should not forget to apply for planning permission before adapting such buildings to this new purpose.

The farmer who confines himself to letting accommodation in the farmhouse must also be prepared for a certain amount of long term investment on, for example, redecorating, new kitchen equipment, including perhaps a deep-freeze, or new washing and lavatory facilities as well as new furnishings, crockery and linen. In addition, there are the running expenses of the enterprise, extra lighting, heating and washing, higher insurance, greater general wear-and-tear, advertising, correspondence and, above all, the food bill—by far the greatest single item. There is a lot of costing to be done before final decisions are taken. There are also a lot of questions to be asked and answered, among them one of the most crucial and difficult that this type of enterprise raises—what charge should be made. Probably the soundest method is to base the charge on that of your neighbours, provided, of course, that they are offering the same kind of accommodation and services.

Requirements of the job

There are also less calculable costs to be assessed, for the demands of this type of business on the farmer and his family are considerable; in particular, they affect the farmer's wife. Here, indeed, she is something more than a partner, for the success of the enterprise depends largely on her.

It is fairly easy to list the main human qualities required by the farmer and his family when they prepare to receive guests. Perhaps the most obvious are a real interest in people and considerable patience and understanding, particularly of the townsman's ignorance of the country and the exuberance of excited children on holiday. So, too, the willingness to accept the sacrifices of privacy and leisure which are inevitable when other people become part of your domestic life. Another is the cheerful readiness to provide at short notice such minor but appreciated extras as packed lunches or cups of tea.

However, the detailed practice of hostmanship is a matter of imaginative commonsense and the capable use of local resources. For example, traditional furniture is preferable to even the best modern design; comfortable chairs are essential; brightly polished brasses, fresh cut flowers, new paint and a general air of caring and cleanliness create an agreeable first impression. Good food, of course, is a prerequisite of a good holiday, especially if it is locally produced and, if possible, prepared according to a local, or at least traditionally rural, recipe. A supply of local guidebooks and a knowledge of local beauty spots, nature reserves and other places of interest, including the more picturesque village pubs which have a peculiar fascination for city-dwellers, are useful assets. A large-scale framed wallmap of the immediate neighbourhood which shows public footpaths will give ideas for walks and discourage inadvertent trespassing. A few farmyard fowls, a few ducks on a pond, a couple of rideable ponies, a sandpit, a swing or perhaps a swimming pool may also prove good investments. Some provision for wet days is essential; on some farms, for instance, part of an old barn can make an agreeable and unusual games room without depriving the farm of useful covered space.

Rewards

So the total input of money, work and thought is appreciable. What are the rewards? There is little detailed evidence on the profits of this type of enterprise, but it is clear that they vary greatly. Thus, a West Country survey in 1970 found that they varied from £80 to £2,400 a year, the average being a little under £850. So much depends on the farm, the farmer, and on the farmer's wife. In other than financial terms, it is significant that a number of farmers have commented on the sheer interest of meeting varied guests and on the friendships they have formed. But, surely, the proof of the pudding is in the eating. You do not have to travel far in many areas of the country to see that a good many farmers find it a worthwhile trade.

Clearly, this type of business can make a useful contribution to farm income. Further, it meets a demand which is likely to increase. But it is not suitable for all farms or all farmers even in areas where it is common. Those who make money from it do so by the familiar combination of good planning, hard work and constant attention to detail. In this, at least, it is no different from the more conventional types of farm enterprise.

Nigel Harvey, M.A., A.R.I.C.S., was for some years an Advisory Officer of the Ministry and later joined the staff of the Agricultural Research Council. He is now with the Department of the Environment.

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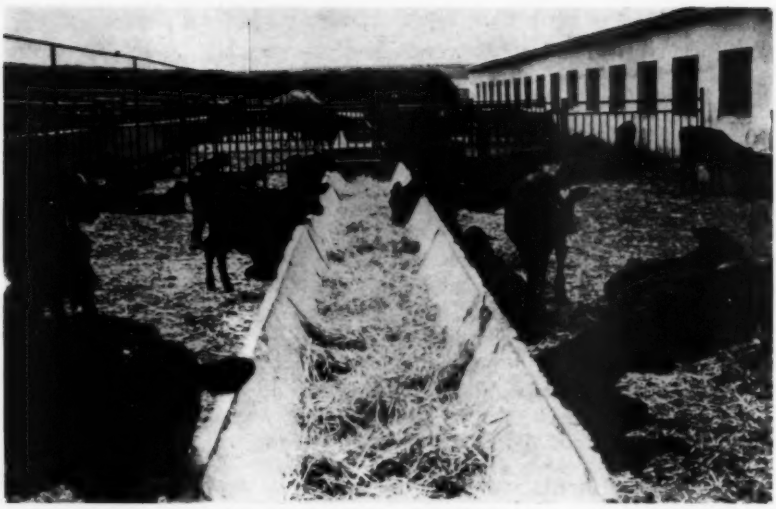
Orchard Grubbing

Fears have been expressed by sections of the public that the Ministry's scheme to encourage the grubbing up of uneconomic apple and pear orchards by offering a special grant equivalent to the full standard cost of the grubbing will lead to the disappearance of apple and pear orchards. This is far from the case: the amount which will eventually be grubbed is expected to be a relatively small part of the total acreage of apples and pears.

There is no question of growers being urged to grub up orchards that are regularly producing good quality fruit. The purpose of the scheme is to promote a strong and efficient fruit industry by getting rid of pockets of orchards which are old, badly-sited, harbour pests and diseases, and are often an eyesore. These orchards produce very poor quality fruit, and altogether represent a heavy drag on the industry.

At present, the efforts of many efficient growers are being undermined by the haphazard marketing of such mediocre fruit from orchards which are barely viable or from old orchards on farms which receive little care and attention. This fruit reaches the market during the autumn and early winter months when supplies from the regular commercial growers are at their peak, and since the growers concerned have little or no interest in the long-term future of apple and pear production, they are often satisfied to take whatever short-term return they can get. This disrupts the market and can have a serious effect for the regular suppliers on whom we must depend, in the end, for our stocks of good quality home-grown fruit.

The special grant is intended to remove this source of weakness by encouraging the owners of these uneconomic orchards to get rid of them once and for all.



Young Red Steppe cattle in the Crimea

A glimpse through western eyes of research and education in agriculture in the Soviet Union.

Soviet Education and Research

A. G. Healey

IN THE spring of 1971, I paid a visit to the Soviet Union under the terms of the Anglo-Soviet Cultural Agreement, accompanied by Mr. A. Fox, Vice-Principal of the Lancashire College of Agriculture. The arrangements were made by the Specialist Tours Department of the British Council and our hosts in the U.S.S.R. were the State Committee on Vocational and Technical Education, who arranged a programme covering Moscow, the northern Caucasus and the Crimea. We were well received everywhere we went, and are very grateful to all concerned.

This brief article, of necessity, concentrates in a limited way on some aspects of education, training and research in the U.S.S.R., and on one major establishment.

Background

The population of the Soviet Union is around 241 million, living in fifteen autonomous republics. The reader will notice the studious avoidance in this

account of the word 'Russia', often used to denote the whole country but more accurately describing one of the constituent republics, albeit the largest. The climate ranges from the arctic to the sub-tropical, through terrain varying from tundra to desert, from mountain to swamp, but including also some of the most fertile soil known to mankind.

Agriculture in the Soviet Union has made remarkable, if somewhat chequered, progress since 1918. All the land is State owned, of course, and the production of crops and animals comes from the Collective and State farms and the lands farmed by the teaching and research establishments.

Irrigation projects on a vast scale have given remarkable crop responses, and mechanization has increased at a rate possibly without parallel. The problems encountered in the attempt to exploit the virgin lands are well known and widely publicized.

The Ministry of Agriculture and the State Committee on Vocational and Technical Education are the two major bodies involved in education. The latter organization is, as its title implies, concerned with the vocational training of young people in all trades, including agriculture. The Ministry of Agriculture concentrates on the one industry, but is also involved with education and research.

Research and Higher Education—The National Pattern

The diagram at Fig. 1 is taken from a paper by Dr. G. I. Vorobyov entitled 'Science and Agricultural Education', presented to the XIV International Conference of Agricultural Economists held at Minsk in 1970.

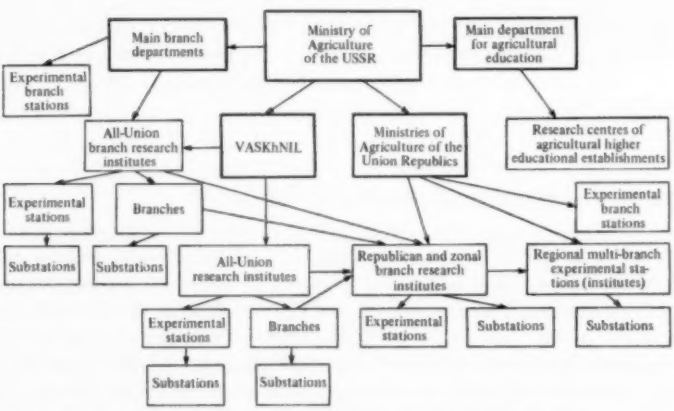


Fig. 1. Administrative structure of agricultural scientific institutions

'VASKhNIL' is the Lenin All-Union Academy of Agricultural Sciences, established in 1929. It has three widely separated sections—in Kiev, Novosibirsk and Tashkent—and appears to be the controlling agency for agricultural research. Education follows a distinct but linked pattern, with its own research and experimental centres.

There seems to be some overlap and duplication both within the Ministry of Agriculture and with the activities of the State Committee, but in such a vast and varied country this is probably inevitable.

Dr. Vorobyov states that there are 366 research stations within the system of the Ministry, with 149 branch institutes, 162 laboratories and 684 experimental and similar establishments, employing in total a research staff of 27,139. We were told that 430,000 students are being trained at degree level and a further 640,000 at middle technical levels.

Machinery on exhibit in Moscow

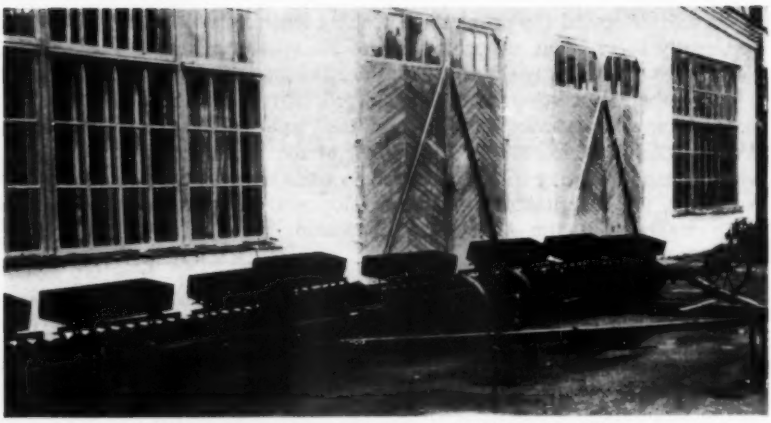
Timiriazev Agricultural Academy, Moscow

This is probably both the largest and the oldest establishment of its kind in the U.S.S.R. It was founded in 1865 and has an international reputation for its work on pedology and for its remarkable collection of soil monoliths.

We were welcomed by the Rector and the Pro-Rector at the headquarters in Moscow proper, on a site of 1,500 acres. There are sixteen associated experimental farms and field centres, covering some 62,000 acres in total. Ninety professors, all of them Doctors of Science, and 400 other members form the teaching and scientific staff. The Administration is headed by the Rector, who is assisted by two bodies, a Scientific Council and a Council for Teaching Methods.

There are some 5,550 students, selected on a basis of severe competitive entry. The main faculties are:

Agronomy	Horticulture
Economics	Animal Husbandry
Agrochemistry	Agropedology



Cultivating machinery used on the vast fields of the Kuban

Research and teaching methods at the Academy

Research follows familiar lines, with special reference to:

(*a*) Soil improvement
(*b*) Crop husbandry on mineral soils
(*c*) The utilization of light by crop plants
(*d*) Forestry development
(*e*) Grassland studies, with special reference to temporary leys
(*f*) The intensification of agricultural and horticultural production
(*g*) The organization of labour and farm planning
(*h*) Agricultural economics and the effective use of capital

Inevitably our discussions at the Academy touched on mutual problems encountered in the teaching of agricultural subjects, and in particular on the conflict between the rapidly increasing accumulation of knowledge and the need to restrict full time courses of instruction to a reasonable length. In this connection the Rector offered three suggestions:

(1) Lecturers should not attempt to cover matters already adequately covered in text-books. They should seek, instead, to fill the gaps in written knowledge, as well as engaging in amplification and interpretation so far as was absolutely necessary.

(2) There must be a greatly increased use of teaching aids. He instanced television, programme learning and teaching machines.

(3) Increasingly, the aim of the teacher must be to encourage students to work on their own, under guidance, and to use their own initiative.

There was, of course, nothing really new and startling in this approach but it was refreshing to have one's own views confirmed so vigorously. Certainly the emphasis on teaching aids was not an idle one, because we were to see time and time again some excellent and imaginative uses of a wide range of aids.

We also discussed the problem of keeping teaching syllabuses up-to-date; apparently there is an annual review of all syllabuses, and an All-Union Committee was recently set up to consider the matter on a national basis.

Two other interesting features emerged. First, the Academy offers a technical advisory service on a contract basis to State and Collective Farms. We saw this in action the following day at the White Dacha State Farm, which is experimenting with hydroponic systems under the supervision of the Academy. The other feature was the development of correspondence courses as an integrated feature of technical instruction.

Comment

We were very impressed by the obvious quality of the research workers and teachers in agriculture and horticulture that we met in the three regions we visited. They have a difficult task to cope with in a country covering thirty distinct climatic and soil zones, and with the need for specialization based on a broad general foundation designed to equip the scientist and teacher to adjust to rapidly changing technologies.

We did, however, get the impression that both education and research suffered as a result of the rigidity imposed by centralized control; and that there seemed to be an apparent lack of interest in, and a reluctance to accept, work being done in the West in both fields, although we found we had much in common and soon established close and happy relationships, even over the barrier of translation.

It cannot be over-emphasized that our visit was very brief and the impressions recorded here must be regarded in the light of what was only an introduction to the agriculture of a vast, fascinating and increasingly important country which has much to offer and much to receive.

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A. G. Healey, N.D.H., is Deputy Principal at the Writtle Agricultural College, Essex.

Grant for Root Crop Research

Research at Bath University, which it is hoped, will improve the production and storage of edible root crops in Britain, has just received an £8,000 grant from the Agricultural Research Council.

The research, which is under the direction of Dr. Peter Rutherford of the University's Biochemistry Group, is at present concentrating on the production of beetroot, rhubarb and chicory, but is it hoped to extend this to a study of other root crops.

Dr. Rutherford's work on root crops has been supported for the last four years by the Ministry of Agriculture, Fisheries and Food both financially and by the Ministry's Research Station at Stockbridge House, Yorkshire and also by the Scottish Horticultural Research Institute at Dundee.

Colourful Environment

H. Penfold

THE desire to create a better environment is almost universally accepted. Amenity, ecology, conservation are now meaningful words rather than likely names of questionable cults made up of odd groups of vociferous people. This better environment is demanding positive planning based on the acceptance that we, in this country, live in an industrialized society. This is not hard to accept when confronted by the depressing development of factories and houses common to most of our industrial cities. Factory buildings in the past were required only to house and protect valuable plant and to provide the minimum of acceptable working conditions for the labour force.

Colour and industry

All this has changed. Factories are now planned to be an acceptable part of the urban environment. Where of necessity they have to be sited in rural areas, particularly power stations and complexes associated with mineral extraction, great care is usually taken in landscaping, and colour is often skilfully used to enhance the overall appearance. Colour is now being increasingly used on industrial buildings generally. Building material manufacturers have recognized the trend and are actively promoting publicity campaigns emphasizing the benefits to be derived from using coloured sheeting. Its advantages are not restricted to making the environment more colourful, but it has other positive benefits such as advertising value, recruitment of labour, healthier effect on workpeople, and reduced maintenance.

Colour and farm buildings

Modern farm buildings are virtually rural factories using the same structural forms as their urban counterparts, but generally on a much smaller scale. As the roofing and cladding materials are also the same it is more than likely that manufacturers will be looking for an increasing use of coloured sheetings on farm buildings. A very different situation from the past when colour on farm buildings was usually associated with the misguided insistence by one or two planning authorities that farm buildings should be painted green.

The Advisory Panel of the Council of Industrial Design in its report* on colour finishes for factory-made cladding used in farm buildings has laid down admirable guide lines for anyone, be he manufacturer or farmer, contemplating using coloured materials. If these are followed, especially if

*Third Report of Advisory Panel on Farm Building; Colour Finishes for Factory-made Cladding used on Farm Buildings, price 30p from The Council of Industrial Design, 28 Haymarket, London S.W.1.

professional designers are employed, distinguished agricultural buildings should result. Even if designers are not employed, ill-considered intrusions into the landscape should be avoided.

Ageing qualities of sheeting

There is one aspect seldom mentioned when considering using modern coloured factory claddings for farm buildings but which should not be ignored. Will they retain their original appearance for a number of years or quickly become shabby? Much of the beauty of the old traditional farm steading in the landscape was due to the natural weathering properties of the materials used. This will not occur with many of the new materials and the manufacturer has the difficult task of trying to ensure that his product will grow old gracefully. This concern is reflected in a recent enquiry by one manufacturer who asked, amongst other questions, which property of a coloured building material is the most convincing. Light fastness, or the retention of the original colour, is a major property required.

Conclusion

Great care should, therefore, be taken in the selection of coloured materials for farm buildings. A combination of traditional and new materials can give the required coloured emphasis. Bricks come in all colours, and creosoted timber, natural or tinted, as well as other materials can weather to give an admirable colour contrast. Concrete panels with exposed aggregates not only provide colour but also surface texture. Painting can be an expensive recurring maintenance item but a considered choice of coloured bitumastic paint will not only protect metal sheeting but improve its appearance. Let us by all means strive towards a more colourful environment but at the same time recognize that there is no particular virtue in using colour for its own sake. Professor Frank Fielden, speaking at the R.I.C.S. Conference at Stirling this year, commented that buildings must be human, capable of ageing without becoming shabby and must accept the discipline of the landscape. Any move towards a colourful environment should be based on these admirable principles; they have their foundations in the traditional homesteads of the past which still enhance the rural environment.

H. Penfold, R.I.B.A., is serving with the Lands Arm, A.D.A.S., Leeds

New Director for Rothamsted

Professor Leslie Fowden, B.Sc., Ph.D., F.R.S., Professor of Plant Chemistry, University College London, has been appointed Director of Rothamsted Experimental Station, Harpenden, Herts., the oldest and largest agricultural research institute in Britain. He succeeds Sir Frederick Bawden who died earlier this year.

It is expected that Professor Fowden will take up his new duties in the spring of 1973.

14. Derbyshire: Ashbourne

J. Trevor Jones

'Derbyshire is a microcosm of England except that it has no sea' wrote John Betjeman. 'In the south it has pastoral country which merges into Leicestershire across the Trent, and here the older cottages and farms are of a dark red brick and the churches are of pale limestone. In the northern half of the county stone never seems far below the surface, and stone of such variety, colour and quality as is found nowhere else in England'.

Towns and villages

Ashbourne itself, a town now built predominantly of red brick, is very much a Midland market town, but its scattered stone buildings are a reminder of its role in the life of the Peak District immediately to the north. Indeed from the fourteenth to the seventeenth century it was often known as Ashbourne-in-the-Peak. No doubt it owes its function as a market town to its position at the junction of the two contrasting areas of peak and plain. For over 700 years Ashbourne has provided a market where the products of these two areas could be interchanged—sheep, wool and lead from the uplands in return for corn, horses, and timber—a town where craftsmen could work and merchants sell their goods. The earliest record of the weekly market is 1257, and to this were subsequently added a number of important annual two or three day fairs catering solely for cattle, horses, pigs or cheese.

Several picturesque villages steeped in history are in the surrounds of Ashbourne. Thorpe and Ilam which stand astride the River Dove at the entrance to Dovedale are visited by thousands every year. It is impossible to convey in words the appeal of this sylvan glade, where the river has worn through the limestone rocks, carving them into strange and fantastic forms such as 'Lion's Head' and the 'Twelve Apostles'. A perfect harmony of trees, rocks and water makes this a most impressive scheme. Izaac Walton and Doctor Samuel Johnson are but two of the many thousands of visitors who have been captivated by this unique spot.

The ancient craft of 'Well Dressing' is featured in several villages, but perhaps the most important of these takes place in the serene village of Tissington. It is said that well dressing took place here over 600 years ago, as a thanksgiving for the village's water supply not having failed during a time of severe drought. Considerable labour is devoted to the decoration of each of the five wells; flower-petals, moss and berries are gathered and pressed into a clay base to form a design or to illustrate a Biblical scene. An appropriate text is added and the whole decoration mounted over the well. A ceremony takes place yearly on Ascension Day. After a service in Tissington's fine old church a procession visits each well in turn and the water is blessed.

Soils and farming

Ashbourne of yesteryear was well known for its 'Shires', and even today at the annual agricultural show there are strong classes of working horses. Today, the dairy industry flourishes more than it ever has in the past. From the rich riverside meadows of the River Dove around Doveridge and Sudbury to the carboniferous limestone uplands north of Ashbourne, the British Friesian cattle are seen in abundance. Some of the pedigree herds in the district are amongst the oldest in the country. The 'Ednaston' herd was founded as far back as 1914 by the late Mr. W. G. Player, and the 'Alsopdale' herd in 1930 by Mr. W. J. Bunting. At the present time there are several well-known pedigree herds in the area.

The farming systems are naturally governed by soil types, topography and size of farms. Most of the soil north of Ashbourne lies on the carboniferous limestone. This soil, though shallow, is of a light to medium texture and very 'workable'. The main enterprise on the limestone is dairying, with livestock rearing and sheep taking an important second place. During the recent past, some of the larger limestone farms have been purchased by lowland farmers, and these are used to rear replacements for the lowland dairy herd.

Bordering on the carboniferous limestone are the limestone shales with soils of a much heavier nature, but on which there are some very good grassland farms. Considerable research and development has been carried out on these 'shale' soils over the past four years.

Following on geological reconnaissance work carried out by the Imperial College, London, it was found that some of these soils had an abnormally high percentage of molybdenum. This affected the uptake of copper in the herbage, and cases of both clinical and sub-clinical hypocuprosis in cattle were found to exist on several farms in the area. Injecting such cattle with copper has brought about a satisfactory solution.

In the kinder climate south of Ashbourne the soils are mainly keuper marl and alluvium and there is a wider range of farming, although here again the main enterprise is dairying. In his 'Agricultural Atlas of England and Wales', J. T. Coppock states that the rich pastoral land of south-west Derbyshire is the sixth most heavily stocked area in Britain, as measured in standard man-days.

The majority of the herds are still milked in single and double row cowsheds, but there has been a considerable increase in cubicle housing and parlour milking over the past three or four years, and with it the inevitable increase in the size of dairy herds. A comparatively new development in this small corner of Derbyshire over the past three years has been the introduction of tower-silos. There are now four such silos, with their associated easy feeding systems. One of these is working very satisfactorily, on a dairy farm at 1,000 ft O.D.; this could possibly be the highest sited tower-silo in the country.

Sheep and sheepdogs

Sheep are kept on several farms, and there are quite large ewe flocks on the limestone. Strangers generally expect to find Derbyshire Gritstone ewes in the area. This is not the case, however, as the Gritstone ewe is found further north on the moorlands. Cluns, Kerries and Suffolks are the main breeds and black-faced 'killing' or store lamb is very much sought after. Important

store lamb sales are held at Hartington and Hulme End in September and October each year and lambs off the limestone farms are always in demand.

Two flockmasters in this district were awarded prizes a few years ago by the Country Landowners' Association for their newly constructed sheep-handling pens. The most interesting feature of these pens was the dip—where the sheep slide gently and gracefully down a forty-five degree slope into the dip without being handled!

An article about this district would not be complete without mentioning the Dovedale Sheepdog Trials. These were founded at the end of the last century and enjoy considerable support. The site of these Trials, lying mid-way between the River Dove and the village of Ilam, is a natural amphi-theatre. Here some of the best dogs in the country compete annually and the coveted Dovedale trophy is keenly contested.

Burning of Gorse

The burning of gorse is a regular and necessary practice on many farms. To minimize the risk to birds and other wildlife and to property, farmers who plan to burn gorse are urged to do so between November and March. Burning should be completed before the end of March so as to avoid the nesting season.

Precautions should be taken. Sufficient people should be present throughout the entire operation, adequately equipped with 'beaters' such as wet sacks, shovels or spades, to control the burning and prevent damage to adjacent land, especially forestry plantations, other woodland areas or buildings.

Essential precautions are:

(1) Burning should be undertaken only on a calm day.

(2) Burning should always be carried out into (against) the wind; never burn down-wind.

(3) Burn early in the day whenever possible and do not burn after dusk.

(4) Ensure that there is an adequate firebreak between the area to be burnt and adjacent property when this includes forestry plantations, other woodland areas or buildings.

(5) Notify neighbours in advance when burning is to be undertaken (at least forty-eight hours notice is desirable). If there is any doubt about the adequacy of the precautions necessary to prevent the spread of fire, the Chief Fire Officer and, in the case of forestry plantations, the local Forestry Commission Officer should be consulted. Make certain also that adequate arrangements are made beforehand so as to ensure the speedy calling of the fire brigade should the burning get out of control.

(6) Never leave burning unattended.

(7) Make sure that all fires are out before leaving the area. Return an hour later to check again.

in brief

- **On-farm grass drying**
- **Pattern of farming manpower**
- **New look at the swede**

On-farm grass drying

EVIDENCE is accumulating that dried grass is now getting greater attention than has been apparent from some time past. Without question, other things being equal it is the most efficient conservation process, giving four times the quantity of feed nutrients per acre as traditional haymaking—more than double the dry matter. About 100,000 tons are currently being produced in Britain, a figure which leaves plenty of leeway for expansion in the right areas.

M. J. Strickland, drawing attention in the latest report of the Ministry's Experimental Husbandry Farm at Boxworth, Cambs*, to the grass drying investigation carried out there last year, makes the important point that with such a high productivity potential, the production of dried grass should require only one-quarter of the acreage normally needed for hay.

Mr. Strickland sees three basic reasons which have so far militated against the production of dried grass: silage, hay and concentrates have served most farms adequately and economically; the limited number of on-farm driers in production (which has meant that both equipment and systems have not been so widely explored as normal conservation methods); and, of course, the comparatively high capital cost of grass driers.

At Boxworth a Hayflaker burner unit and two drum trailers dealt with some 36 acres of grassland between mid-April and the end of August, with cutting at four-weekly intervals. The dried grass was fed to heifers in the loose chopped form for both maintenance and production. Complete results were not available at the time the report went to press but, says Mr. Strickland, 'it does appear that this may be a cheaper method of feeding than a hay or straw balancer system, despite the high cost of feed. Such a system also has the advantage of great simplicity, as it involves one feed only and has a lower labour requirement for feeding out the chopped material from a forage trailer direct into mangers'. The full account, including rate of work, production costs, output figures and quality of the product, makes extremely interesting reading, and the author's suggestion of a one-drum system, using a simpler form of drier in order to cut capital expenditure considerably, widens the attractiveness of this method of grass conservation.

Of paramount influence is the present and likely future cost-pattern of feedingstuffs. Thus, logically, it seems only to be a matter of prudence that individual farmers should re-examine the economics of their feeding systems with the idea of turning to grass drying from what may have become just the habit of making silage and hay.

*The Boxworth report, 1971, may be obtained free from the Executive Officer of the Farm.

Pattern of farming manpower

MANPOWER on the farms of England and Wales has been the subject of a survey* by the Economic Development Committee for Agriculture, covering 3,940 holdings, with 4,768 farmers and 4,834 workers, including managers. This represents 3 per cent of all farmers, partners and directors on holdings with 275 or more standard man days and 1·9 per cent of all regular workers on full-time holdings in England and Wales at June 1970. The results differ from those obtained from the annual agricultural census in that they add depth to the manpower profile, so that what emerges is a clearer picture of the individuality of the men (and women) who elect to tie their lives and livelihood to the soil and, by aggregation, make up the pattern of present-day farming.

Thus the average farmer is shown to be forty-six years old, with 53 per cent over forty-five and nearly 9 per cent over sixty-five; 21 per cent are under thirty-five. Younger farmers were found more frequently on dairy and pig and poultry farms and also on farms employing no regular labour—reflecting, no doubt, a larger proportion of the new and comparatively new aspirants to a farming career. The average farmer works a 64-hour week, and of the total labour input by farmers, 43 per cent is spent on livestock (nearly 20 per cent on dairy cattle) and 30 per cent on arable cropping and grass. Just over one-half of farmers have working wives who leave their domestic duties to help for about seventeen hours a week. (Taking all wives into account, the figure averaged out at nine hours a week.)

Farm employees work on average fifty-two hours a week, nearly half of this time being spent on cropping enterprises, about one-third with livestock and the rest on maintenance duties. On average, workers are nearly ten years younger than farmers; 29 per cent are aged twenty-five and under, 18 per cent between twenty-six and thirty-four. Younger workers are more commonly found on dairy, livestock and pig and poultry farms. A substantial proportion of workers enter farming direct from school but leave before they are thirty.

The survey also looked at the educational aspect of the manpower make-up. Seventy per cent of all farmers had left school by the time they were fifteen, and for 86 per cent of them farming was their first regular job. As would be expected, the great majority (nearly three-quarters) had a background of a family farm. More of the under-thirties tend to have secondary educational qualifications and have had or are undergoing further agricultural studies. This reflects the much greater opportunities for specialist training available to the younger generation in a now highly sophisticated industry.

The term 'manager' needs to be interpreted liberally—between those running large farming companies at one end of the scale and those 'on a hobby farm' supervising the work but having no decision-making responsibility at the other. Their numbers are estimated at some fifteen and a half thousand and the majority of them in the south of England. On average, they are a little younger than their employers, work (sometimes assisted by their wives) shorter hours, and a high proportion has some specialist academic qualification, especially the younger men.

The report provides a wealth of statistically-based information. But over and beyond the details, the relationship shown between the farming manpower in England and Wales and the high productivity of the industry clearly emphasizes the special quality of that small sector of the nation which is in partnership with the soil.

New look at the swede

THE swede, championed by Cobbett, and with its generic companion, the turnip, once the pivotal crop of the Norfolk four-course, has been at a discount ever since the opening years of this century—a fact which has mirrored the rising cost and availability of farm labour and the vacillations in sheep values. But a new look at

*Agricultural Manpower in England and Wales, available from H.M. Stationery Office, price £1·20 (£1·33 by post).

the modern possibilities of this crop is gaining favour in suitable livestock areas, in particular in Wales, since direct drilling in chemically treated grassland has put the economics of growing it on a more attractive basis. That it is worth while from the purely feeding angle has never been in doubt; an acre of well-grown swedes, yielding say 25 tons, can provide some 4,000 lb of starch equivalent—double what can be expected from cereals and, indeed, more than is obtained from the average grazed pasture; the yield of protein is also high.

Direct drilling has slashed cultivation time to minimal proportions, and the crop can be sown immediately after hay harvest so long as the follow-on growth is sufficient to accept a lethal spray of paraquat (4 pints per acre). Where, ideally, the crop can be fed *in situ*, it is obvious that this cheap and nutritious winter feed is one way of circumventing high cereal prices. For farms in the cool, moist areas of the country it's a thought for next year's programme. The local A.D.A.S. officer will be only too willing to advise on details.

AGRIC

Ministry Publications

Since the list published in the October issue of *Agriculture* (p. 454) the following publications have been issued.

MAJOR PUBLICATIONS

BULLETIN

No. 21 Home Preservation of Fruit and Vegetables (Revised) 65p (by post 71½p) (SBN 11 251321 8)

PLANT PATHOLOGY

No. 3 Volume 21 (New) 42½p (by post 47p) (SBN 11 722427 8)

FIXED EQUIPMENT OF THE FARM

No. 52 The Appearance of Farm Buildings in the Landscape (New) 26p (by post 28½p) (SBN 11 240592 4)

FREE ISSUES

ADVISORY LEAFLETS

No. 183 Narcissus Flies (Revised)

No. 199 Wireworms (Revised)

No. 409 Stem Eelworm on Clover (Revised)

SHORT TERM LEAFLETS

No. 67 Farm Waste Disposal (Revised)

No. 74 Cow Identification (Revised)

No. 78 Low Continuous Plastic Tunnels for Early Strawberry Production (Revised)

FARM MECHANIZATION STUDIES

No. 21 Wheeled and Tracklaying Tractors (New)

UN-NUMBERED LEAFLET

E.E.C. Standards for Fresh Apples and Pears (New)

Single copies of free items are obtainable from the Ministry of Agriculture, Fisheries and Food (Publications), Tolcarne Drive, Pinner, Middlesex HA5 2DT.

Books

Soils of the Exeter District. BEN CLAYDON Soil Survey of England and Wales. *£3*

This book describes an area of 250,000 acres of south Devon bounded by the sea from Torquay to Budleigh Salterton, northwards across Dartmoor to Crediton on the western side and to near Cullompton in the east. Its title 'Soils of the Exeter District' may therefore be regarded as rather a restricted shop window for this excellent Soil Survey publication and fails to display the full contents of its interior which embraces an account of soils of the well known 'Redlands', the contrasting greyish brown 'Dunlands', the eastern fringes of picturesque Dartmoor, the rolling Devonian slate hills, Haldon and the Bovey Basin.

The opening chapter of this 250 page publication deals with the three major factors governing soil properties, geology, geomorphology and climate. Data showing the wide variations in local climate is simply but clearly presented and their effects on land use are discussed.

Chapter two describes the soil survey methods and techniques used in the classification of soils and it is recommended that readers who are new to the subject of soil science should at the outset grasp the meaning of 'soil series' which is the basic unit of soil classification.

A soil map with a scale of one inch to one mile is included. Using a clever system of colour and annotations over ninety soil units are well defined on the map; at a glance, they may reflect confusion and complexity to the layman, but the explanation key on the left of the sheet greatly simplifies the interpretation of the survey.

The book and map is a brand new collection of information on a most delightful part of Devon and is of interest to a wide range of students. Enthusiasts of the environment and ecologists will find a store of reference data; farmers, horticulturists, foresters and particularly advisers will find a wealth of useful information on the physical resources of the land together with a capability classification. In the present day and age it is necessary for available land resources to be utilized to the greatest effect; one of the major factors in assessing land use and its value is its drainage condition—you can learn a lot about this from the map without even getting your feet wet!

Today we are in greater need than ever for better knowledge of our soils and their behaviour, this book by Ben Claydon is a worthy addition to the Soil Survey memoirs.

The book may be obtained from the Soil Survey, Rothamsted Experimental Station, Harpenden, Herts.

R.T.

Instrumentation in Agriculture. S. W. R. Cox and D. E. FILBY. Crosby Lockwood and Son, 1972. £2·60.

'Instrumentation' is already important in agriculture and horticulture, and future developments in this field will no doubt have an increasing impact on labour productivity.

In this book the subject is treated very broadly by Sidney Cox and Douglas Filby of the N.I.A.E's Instrumentation Division, who cover not just the use of measuring instruments but also the application of controls which involve measurement techniques. The scope is indicated by the chapter headings.

Beginning with 'the background to instrumentation' there is a simple explanation of some first principles, such as the meaning of digital and analogue signals, and of how electrical and electronic instrumentation involves three basic elements, viz. (1) the transducer—a combination of a sensor and a conversion element or process which produces an electrical signal; (2) signal transfer and processing equipment, and (3) a display unit which enables the signal to be read or recorded.

A chapter on 'the aerial environment' covers the characteristics and some applications of various types of thermometers and measurement of humidity, air flow, and radiation. A similar chapter deals with measurements concerned with the soil and soil water, including irrigation.

Another on moisture in crops naturally includes the advantages of various types of grain moisture meters.

In the chapter on measurement of mass and volume, the authors show good judgement in giving priority to the British System of weights and measures, quoting SI units where appropriate. There is a useful discussion on the more complex types of weighing machines, covering hydraulic, pneumatic and electrical load

cells and continuous belt weighers.

Other chapters deal with product quality assessment, the use of instruments to assist in controlling and investigating the performance of agricultural machines and equipment, and automatic control. The chapter on automatic control is not comprehensive but includes such developments as x-ray sorting of potatoes from stones and clods, etc.

This book is written primarily for those who have no specialist knowledge of instrumentation but a desire to learn. The treatment is mainly non-mathematical and introductory. For those who wish to go further, there are references at the end of each chapter. The book will be of particular interest to agricultural engineers in advisory and research services, and to those concerned with the detail of advanced farming installations and techniques.

C.C.

Agricultural Chemicals Approval Scheme

There are no Additions or Amendments to the 1972 List of Approved Products for Farmers and Growers this month.

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AGRICULTURE

Publication of the Journal will cease at the end of this year. In its place, the Ministry will publish a new monthly journal which will carry news and explanation on all aspects of the Ministry's responsibilities—food, agriculture and fisheries—the most important of which will be on E.E.C. directions and regulations. It will include articles and statistical information of interest to all elements of the farming, food and fishing industries.

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